PROCESS TO GROUP MODEMS BY MODEM TYPE AND COMMAND EACH TO SEND UPSTREAM DATA ON AN UPSTREAM CHANNEL HAVING SUITABLE BURST PROFILE CHARACTERISTICS MATCHED TO THE MODEM'S THROUGHPUT CAPABILITY

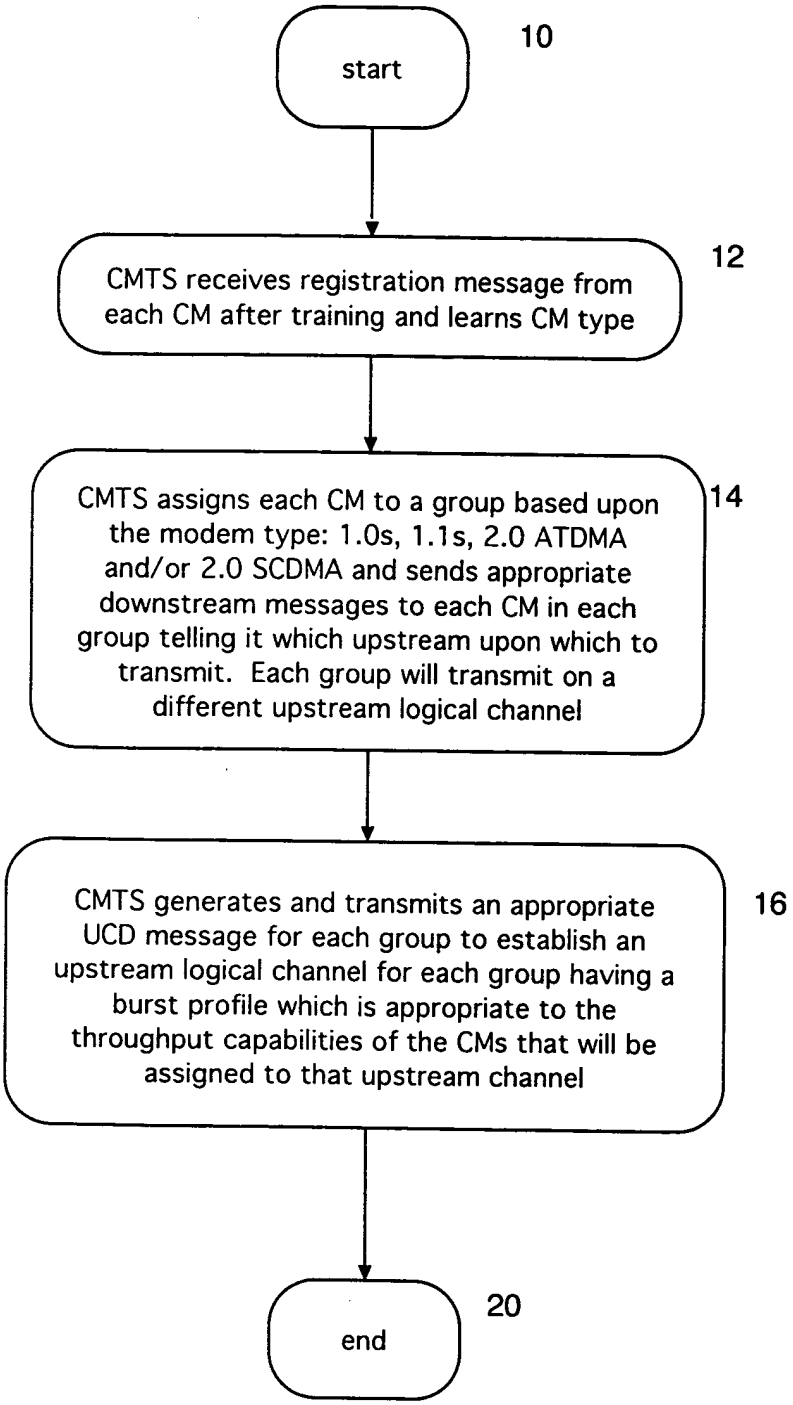


FIG. 1

PROCESS TO GROUP AND SUBGROUP MODEMS BY MODEM TYPE AND RECEIVED POWER AND COMMAND EACH TO SEND UPSTREAM DATA ON AN UPSTREAM CHANNEL HAVING SUITABLE BURST PROFILE CHARACTERISTICS MATCHED TO THE MODEM'S THROUGHPUT AND RECEIVED POWER - SPECIES 4

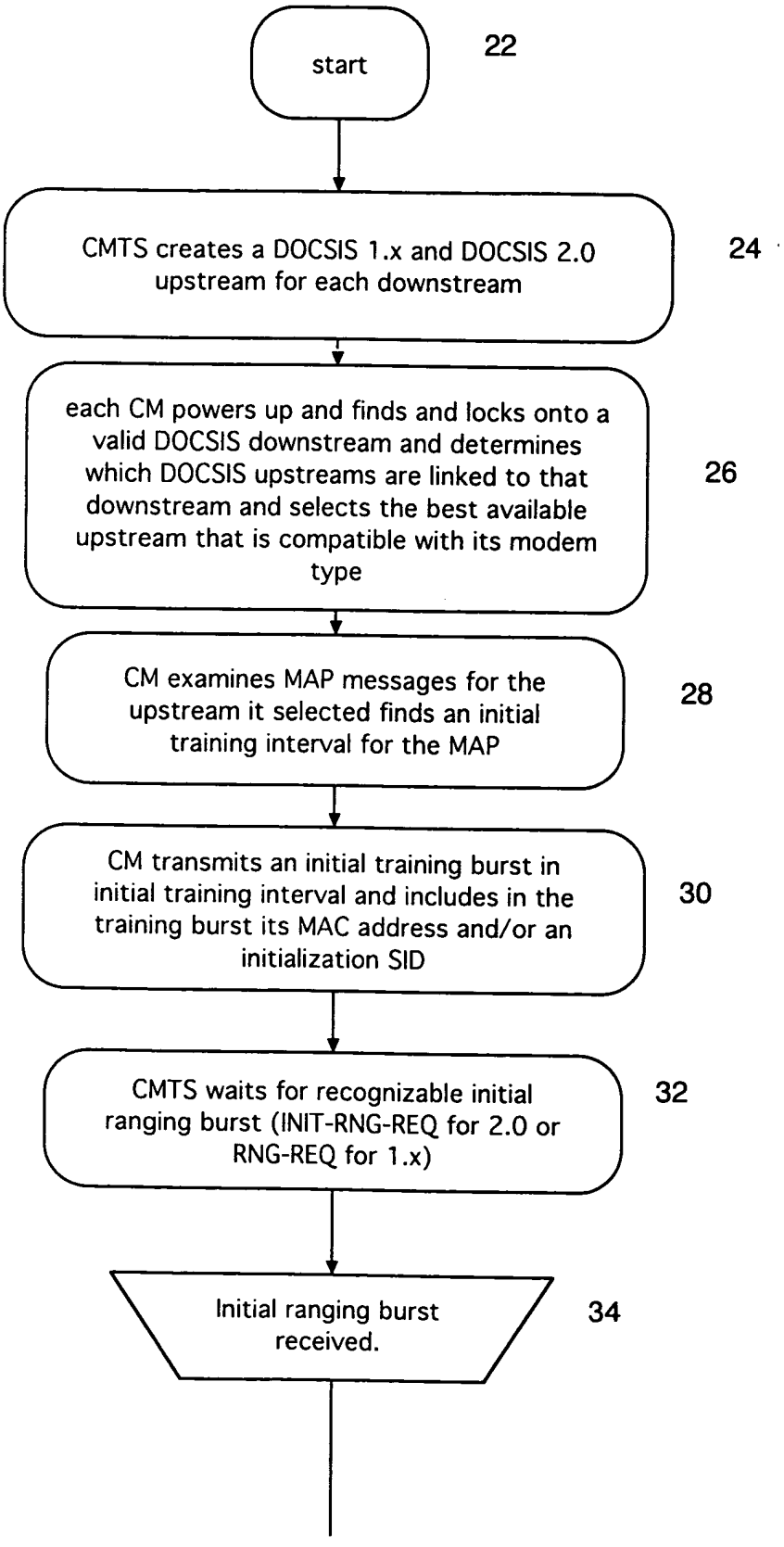


FIG. 2A

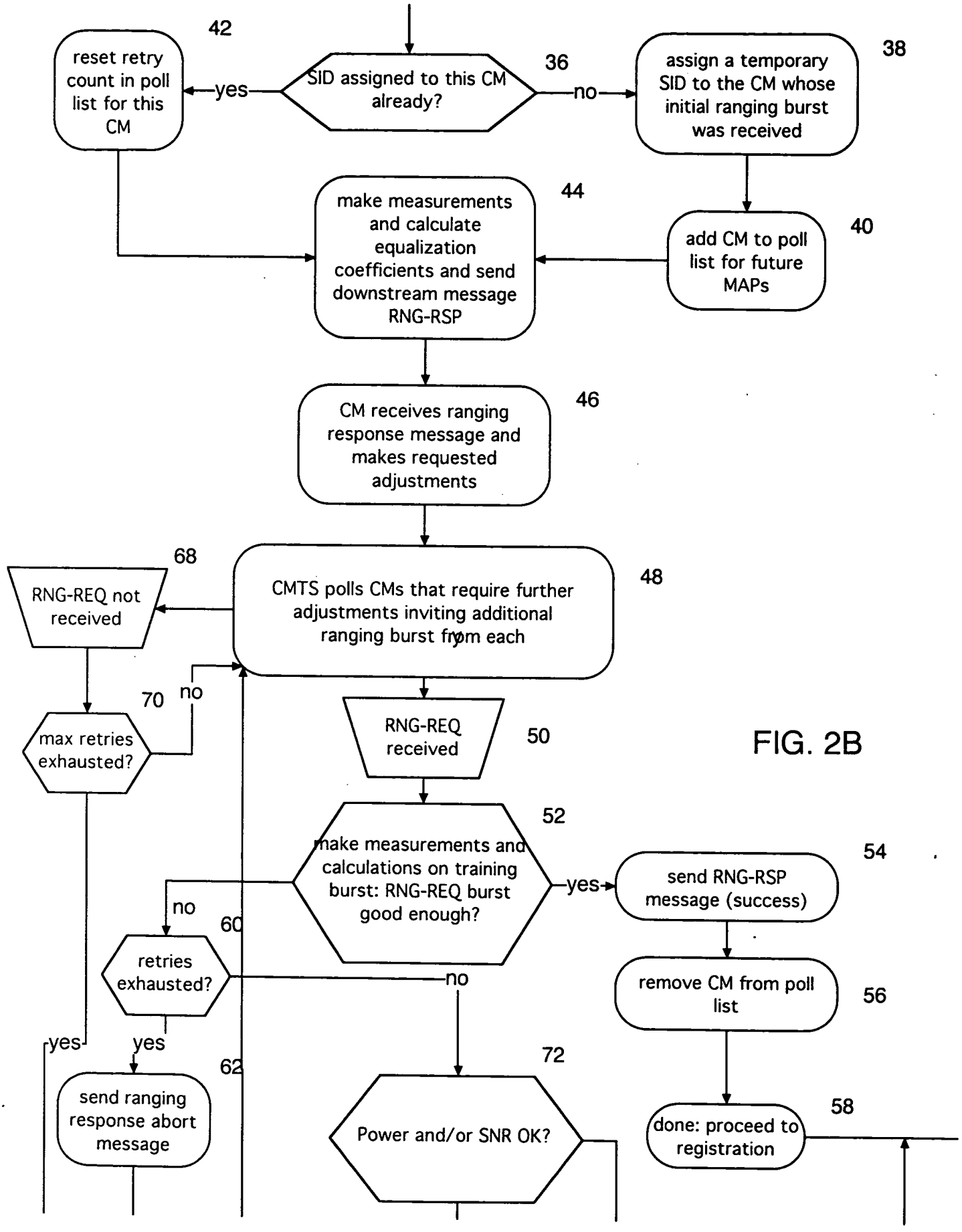

42
reset retry count in poll list for this CM
yes
SID assigned to this CM already?
36
no
assign a temporary SID to the CM whose initial ranging burst was received
38
make measurements and calculate equalization coefficients and send downstream message RNG-RSP
44
add CM to poll list for future MAPs
40
CM receives ranging response message and makes requested adjustments
46
68
RNG-REQ not received
CMTS polls CMs that require further adjustments inviting additional ranging burst from each
48
70
no
max retries exhausted?
RNG-REQ received
50
52
make measurements and calculations on training burst: RNG-REQ burst good enough?
yes
send RNG-RSP message (success)
54
no
60
retries exhausted?
no
remove CM from poll list
56
yes
yes
62
send ranging response abort message
72
Power and/or SNR OK?
done: proceed to registration
58

FIG. 2B

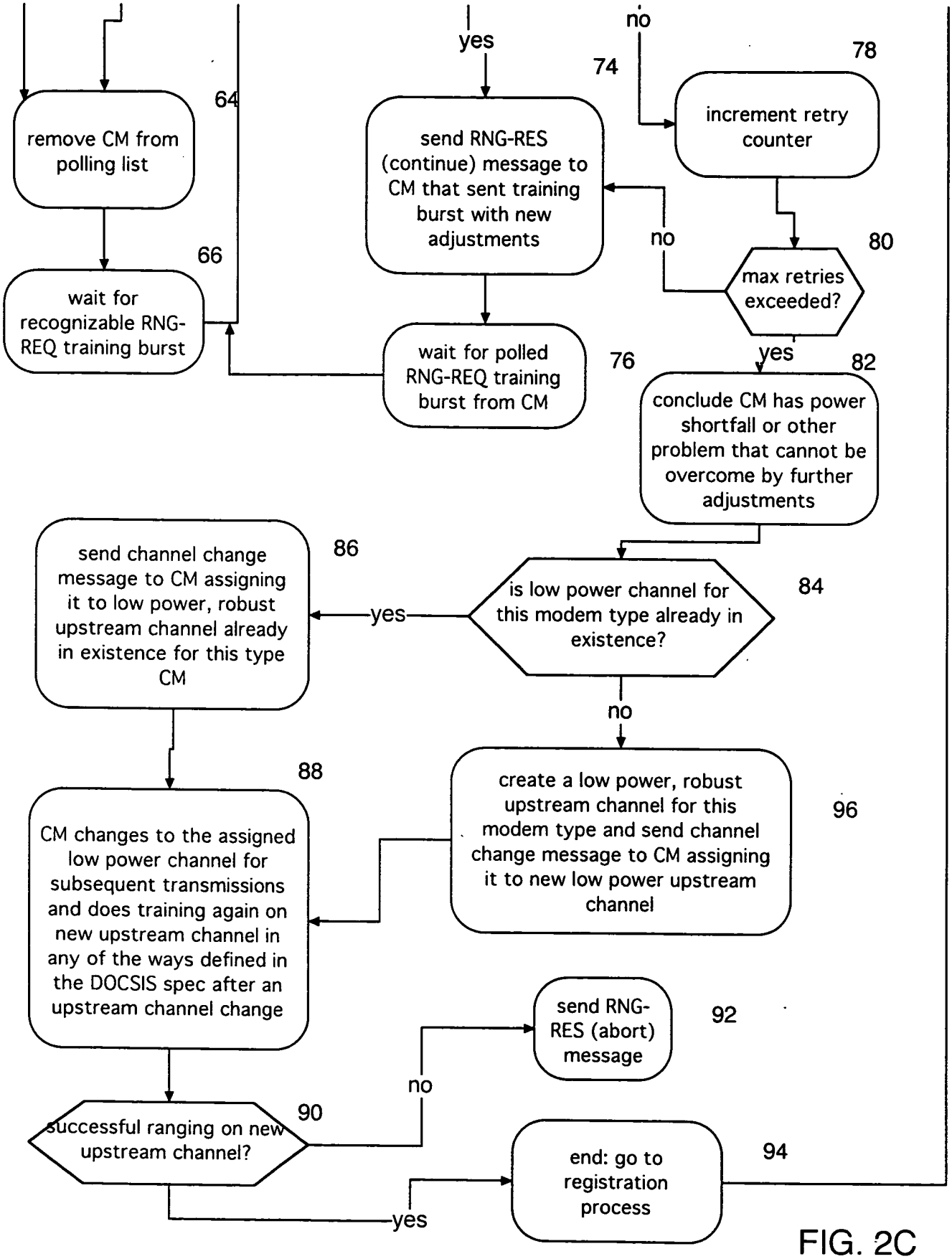

remove CM from polling list
64
wait for recognizable RNG-REQ training burst
66
yes
send RNG-RES (continue) message to CM that sent training burst with new adjustments
wait for polled RNG-REQ training burst from CM
76
no
74
increment retry counter
78
no
max retries exceeded?
80
yes
82
conclude CM has power shortfall or other problem that cannot be overcome by further adjustments
is low power channel for this modem type already in existence?
84
yes
send channel change message to CM assigning it to low power, robust upstream channel already in existence for this type CM
86
no
create a low power, robust upstream channel for this modem type and send channel change message to CM assigning it to new low power upstream channel
96
CM changes to the assigned low power channel for subsequent transmissions and does training again on new upstream channel in any of the ways defined in the DOCSIS spec after an upstream channel change
88
successful ranging on new upstream channel?
90
no
send RNG-RES (abort) message
92
yes
end: go to registration process
94

FIG. 2C

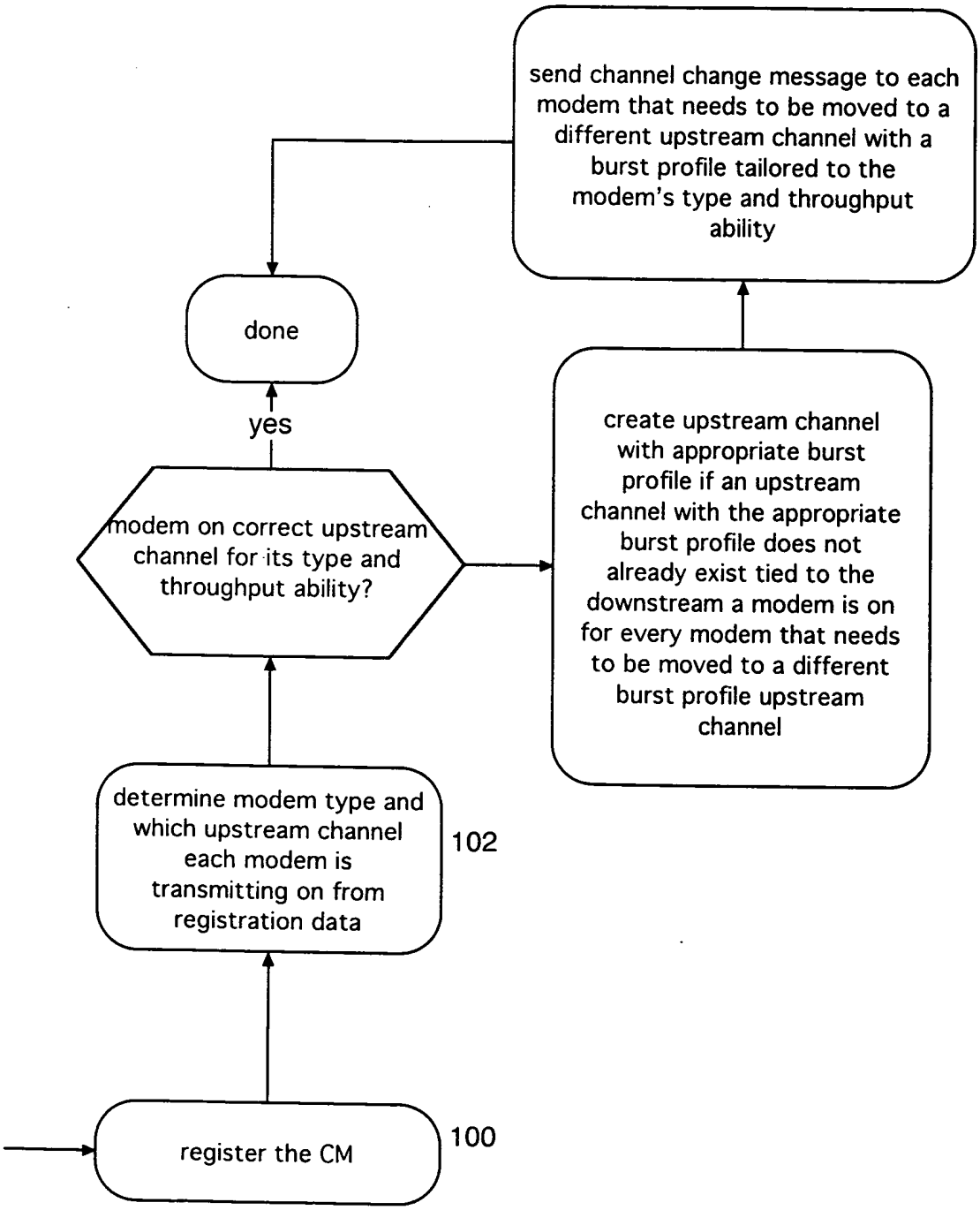

send channel change message to each modem that needs to be moved to a different upstream channel with a burst profile tailored to the modem's type and throughput ability
done
yes
modem on correct upstream channel for its type and throughput ability?
create upstream channel with appropriate burst profile if an upstream channel with the appropriate burst profile does not already exist tied to the downstream a modem is on for every modem that needs to be moved to a different burst profile upstream channel
determine modem type and which upstream channel each modem is transmitting on from registration data
102
register the CM
100

FIG. 2D

PROCESS TO GROUP AND SUBGROUP MODEMS BY MODEM TYPE, SNR AND/OR RECEIVED POWER AND COMMAND EACH TO SEND UPSTREAM DATA ON AN UPSTREAM CHANNEL HAVING SUITABLE BURST PROFILE CHARACTERISTICS MATCHED TO THE MODEM'S THROUGHPUT AND RECEIVED POWER AND/OR SNR

SPECIES 5

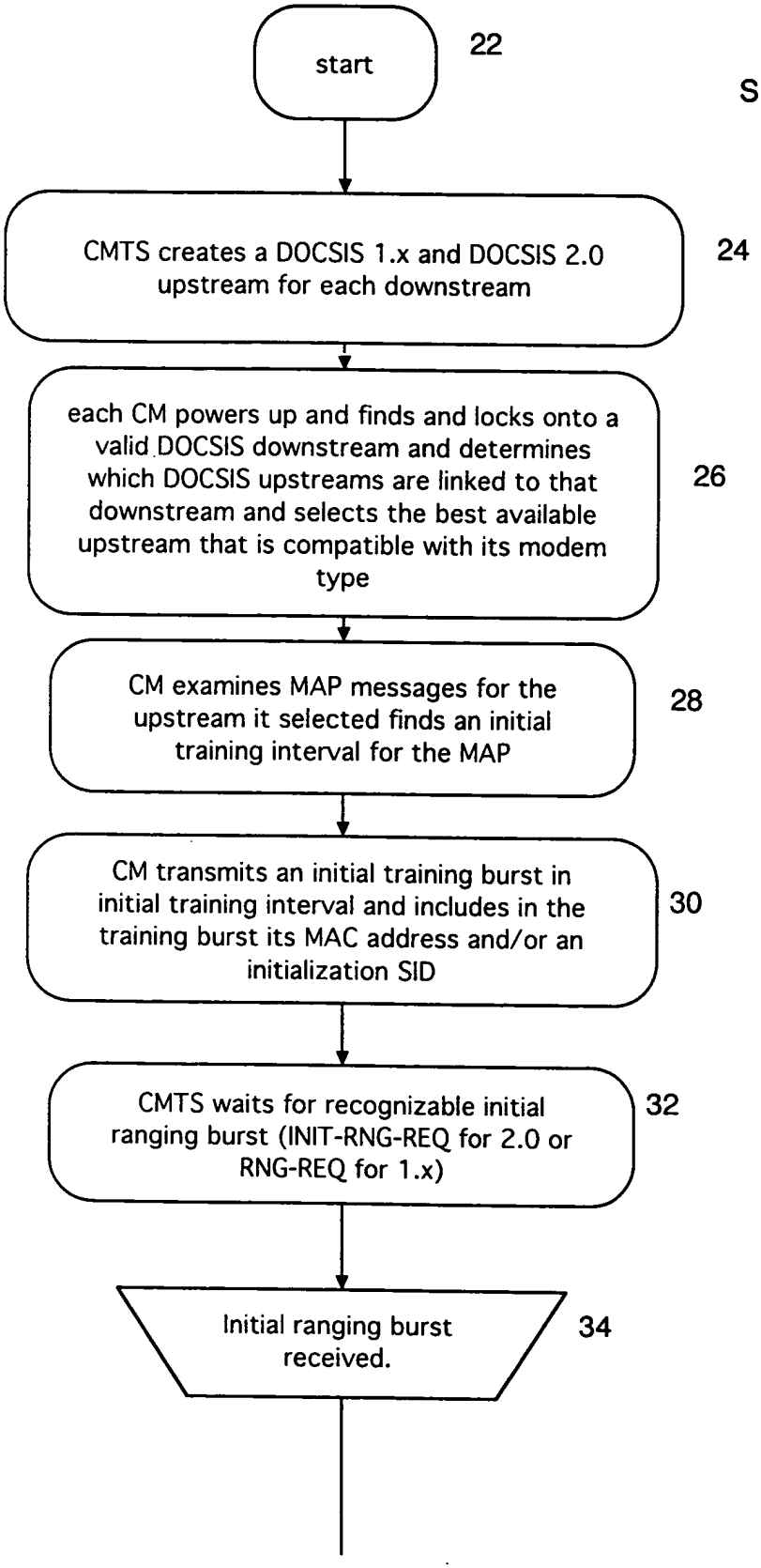


FIG. 3A

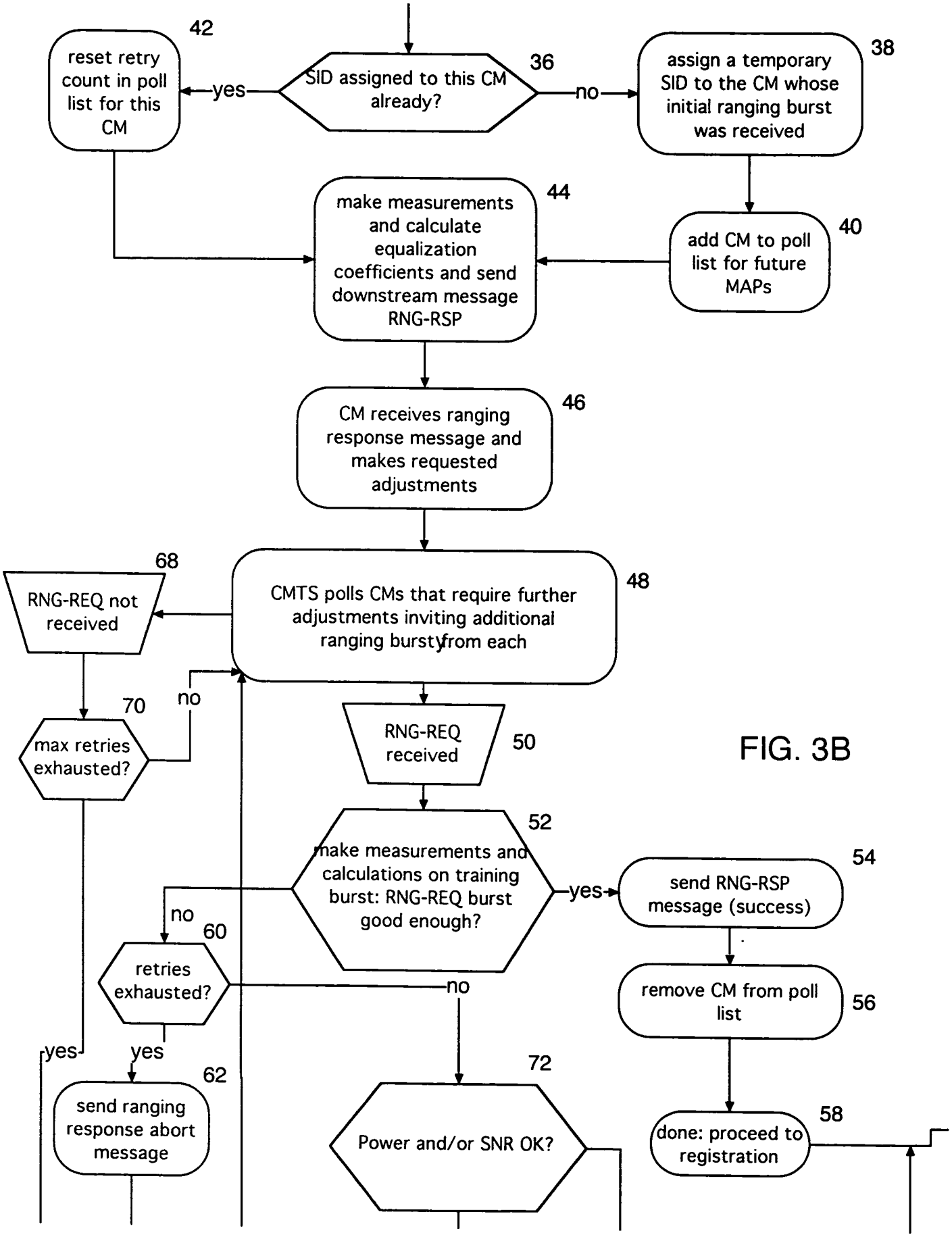

SID assigned to this CM already?
36
yes
no
reset retry count in poll list for this CM
42
assign a temporary SID to the CM whose initial ranging burst was received
38
add CM to poll list for future MAPs
40
make measurements and calculate equalization coefficients and send downstream message RNG-RSP
44
CM receives ranging response message and makes requested adjustments
46
CMTS polls CMs that require further adjustments inviting additional ranging burst from each
48
RNG-REQ not received
68
RNG-REQ received
50
max retries exhausted?
70
no
make measurements and calculations on training burst: RNG-REQ burst good enough?
52
yes
send RNG-RSP message (success)
54
remove CM from poll list
56
done: proceed to registration
58
retries exhausted?
60
no
yes
send ranging response abort message
62
Power and/or SNR OK?
72

FIG. 3B

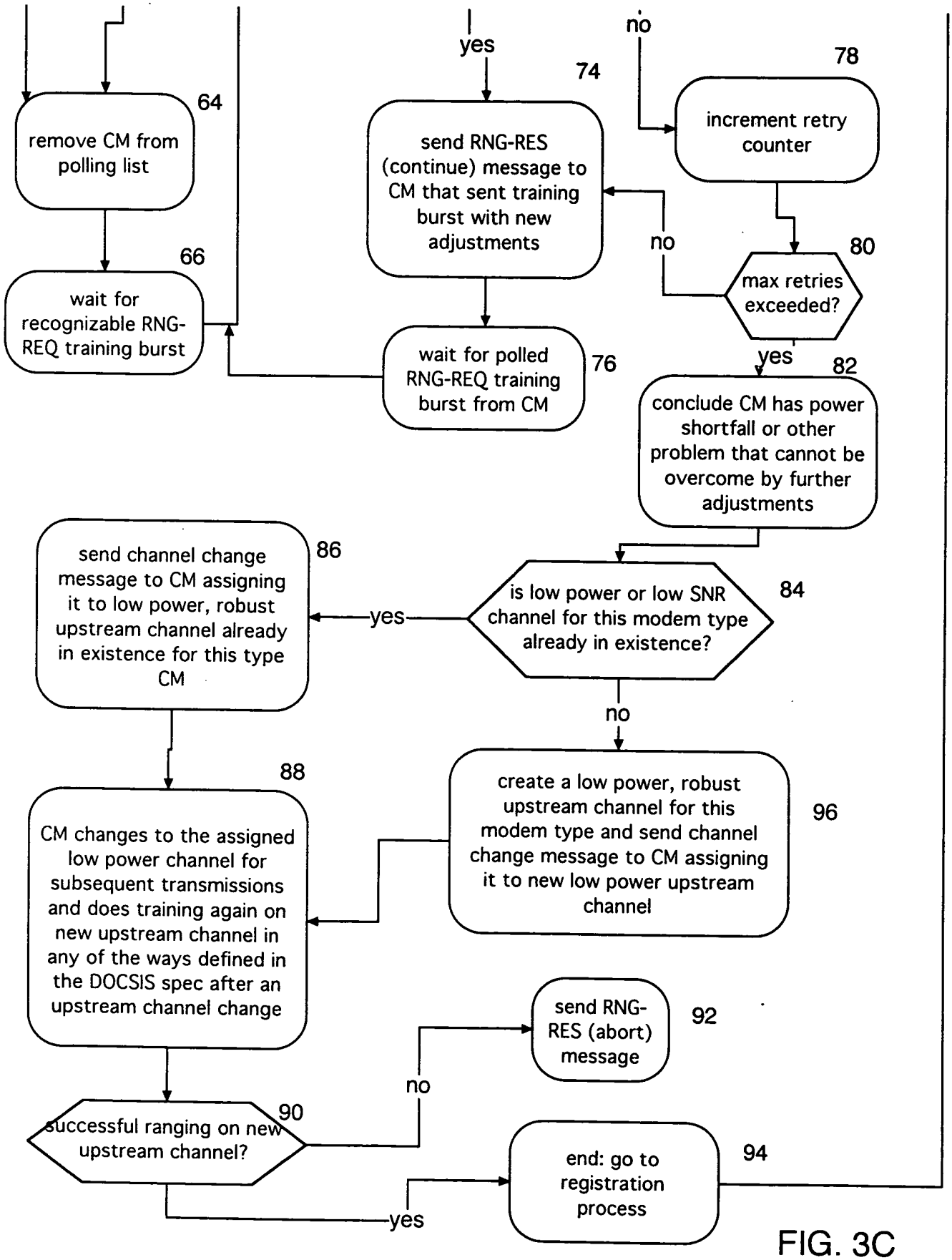
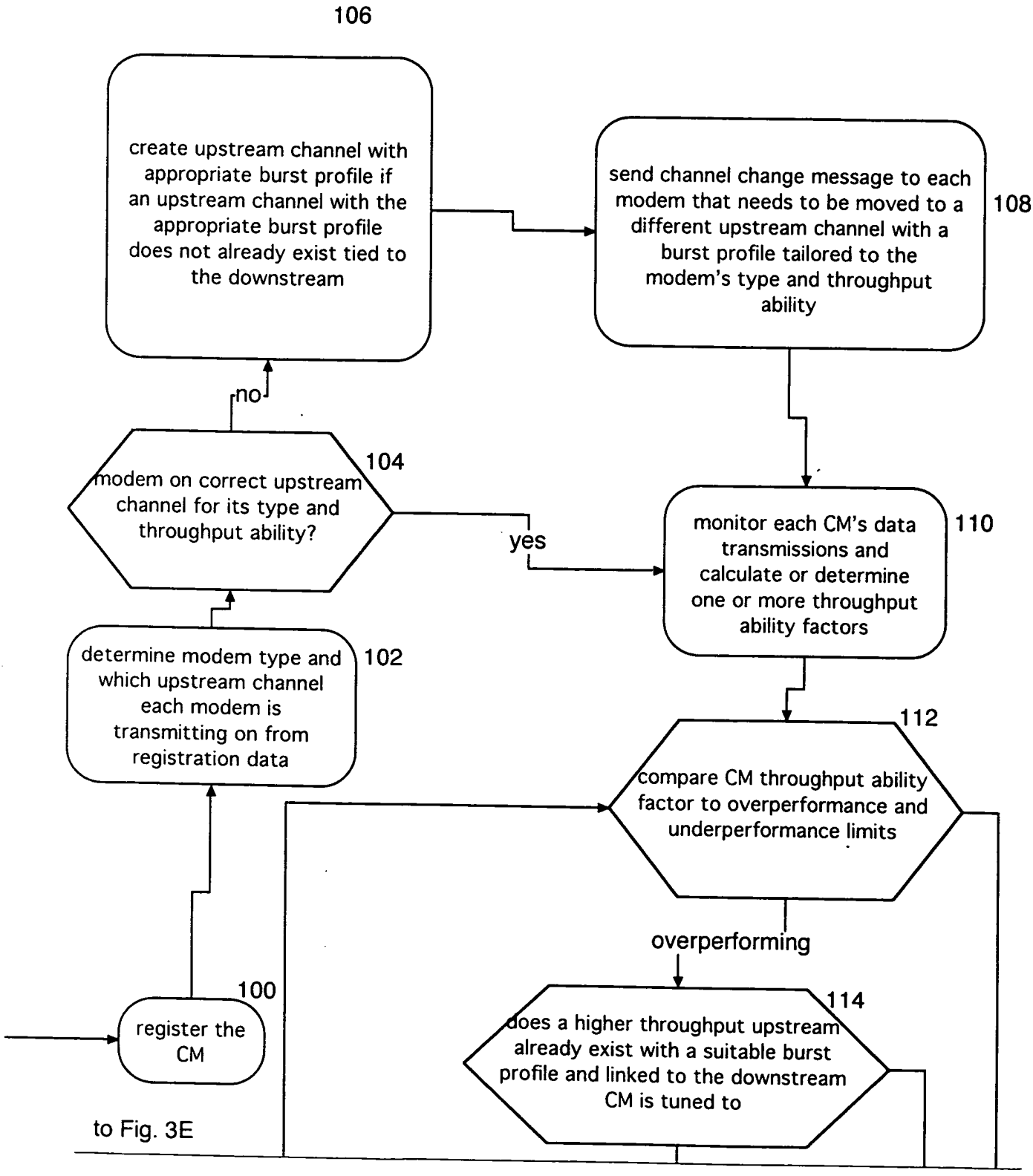

yes
no
78
74
64
remove CM from polling list
send RNG-RES (continue) message to CM that sent training burst with new adjustments
increment retry counter
no
80
66
max retries exceeded?
wait for recognizable RNG-REQ training burst
wait for polled RNG-REQ training burst from CM
76
yes
82
conclude CM has power shortfall or other problem that cannot be overcome by further adjustments
send channel change message to CM assigning it to low power, robust upstream channel already in existence for this type CM
86
yes
is low power or low SNR channel for this modem type already in existence?
84
no
88
create a low power, robust upstream channel for this modem type and send channel change message to CM assigning it to new low power upstream channel
96
CM changes to the assigned low power channel for subsequent transmissions and does training again on new upstream channel in any of the ways defined in the DOCSIS spec after an upstream channel change
send RNG-RES (abort) message
92
no
90
successful ranging on new upstream channel?
end: go to registration process
94
yes

FIG. 3C

FIG. 3D


106
create upstream channel with appropriate burst profile if an upstream channel with the appropriate burst profile does not already exist tied to the downstream
send channel change message to each modem that needs to be moved to a different upstream channel with a burst profile tailored to the modem's type and throughput ability
108
no
modem on correct upstream channel for its type and throughput ability?
104
yes
monitor each CM's data transmissions and calculate or determine one or more throughput ability factors
110
determine modem type and which upstream channel each modem is transmitting on from registration data
102
112
compare CM throughput ability factor to overperformance and underperformance limits
overperforming
100
register the CM
114
does a higher throughput upstream already exist with a suitable burst profile and linked to the downstream CM is tuned to
to Fig. 3E

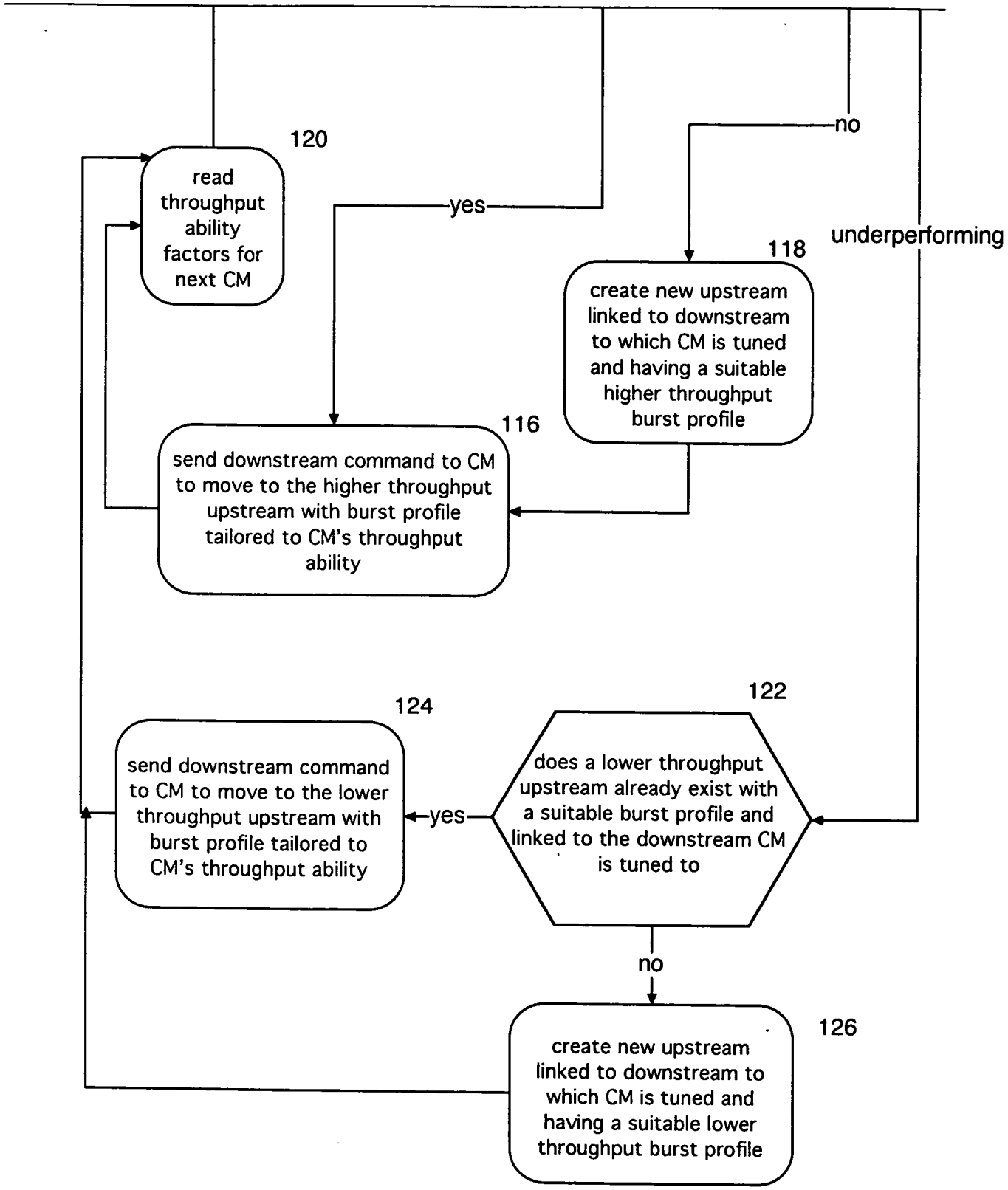

120
read throughput ability factors for next CM
yes
no
underperforming
118
create new upstream linked to downstream to which CM is tuned and having a suitable higher throughput burst profile
116
send downstream command to CM to move to the higher throughput upstream with burst profile tailored to CM's throughput ability
122
does a lower throughput upstream already exist with a suitable burst profile and linked to the downstream CM is tuned to
yes
124
send downstream command to CM to move to the lower throughput upstream with burst profile tailored to CM's throughput ability
no
126
create new upstream linked to downstream to which CM is tuned and having a suitable lower throughput burst profile

FIG. 3E

SPECIES 2

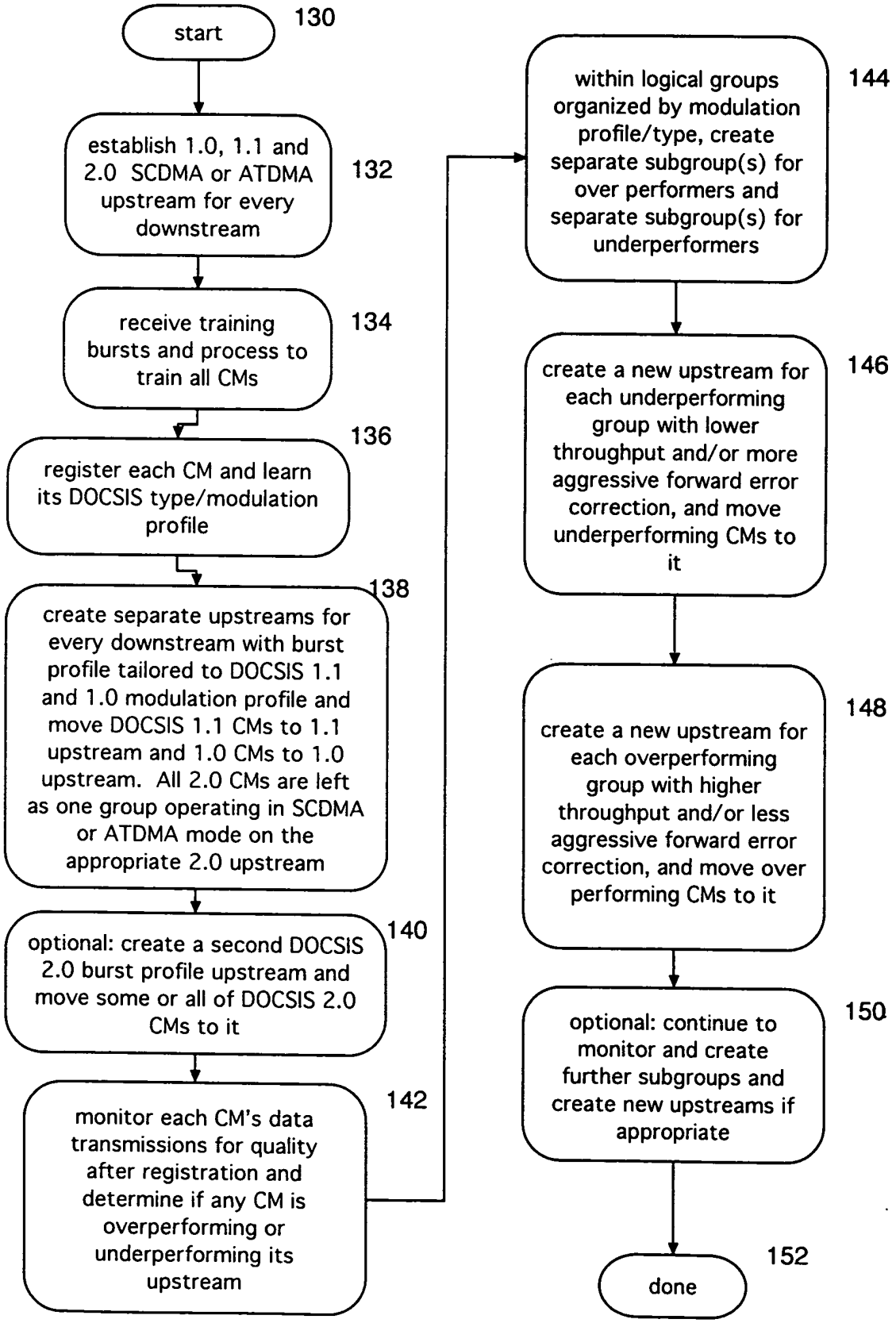


FIG. 4

SPECIES 3/2

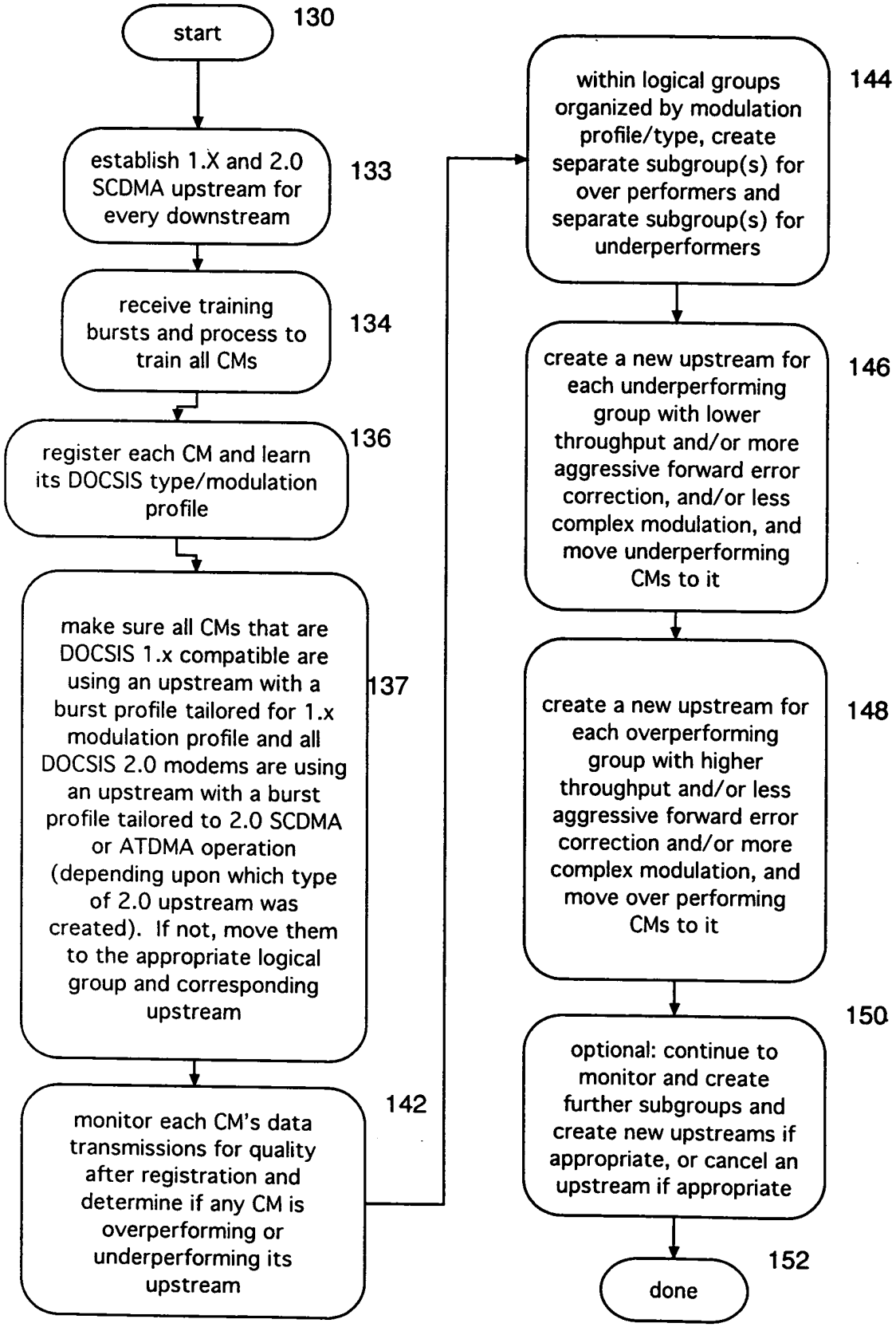


FIG. 5

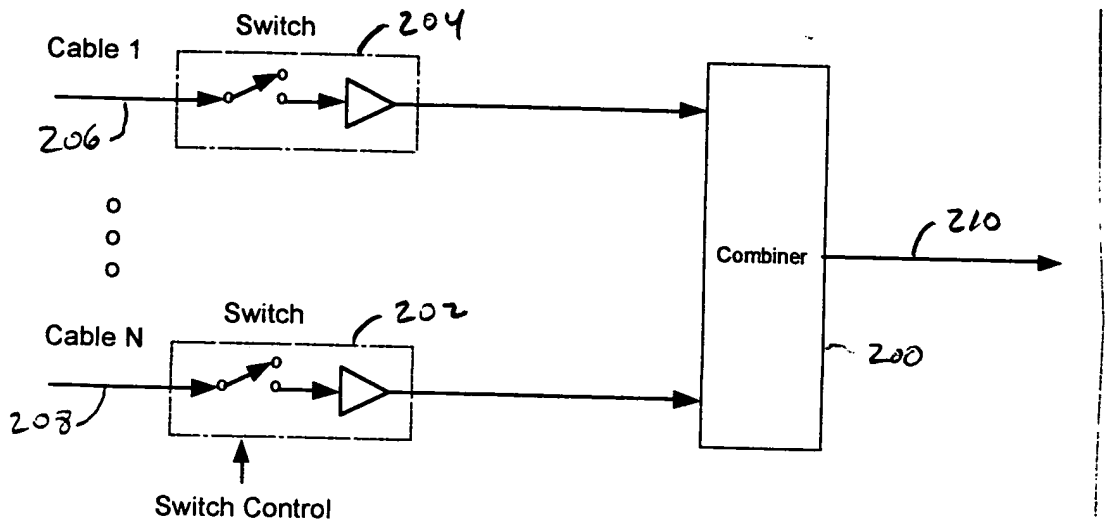


FIG. 6

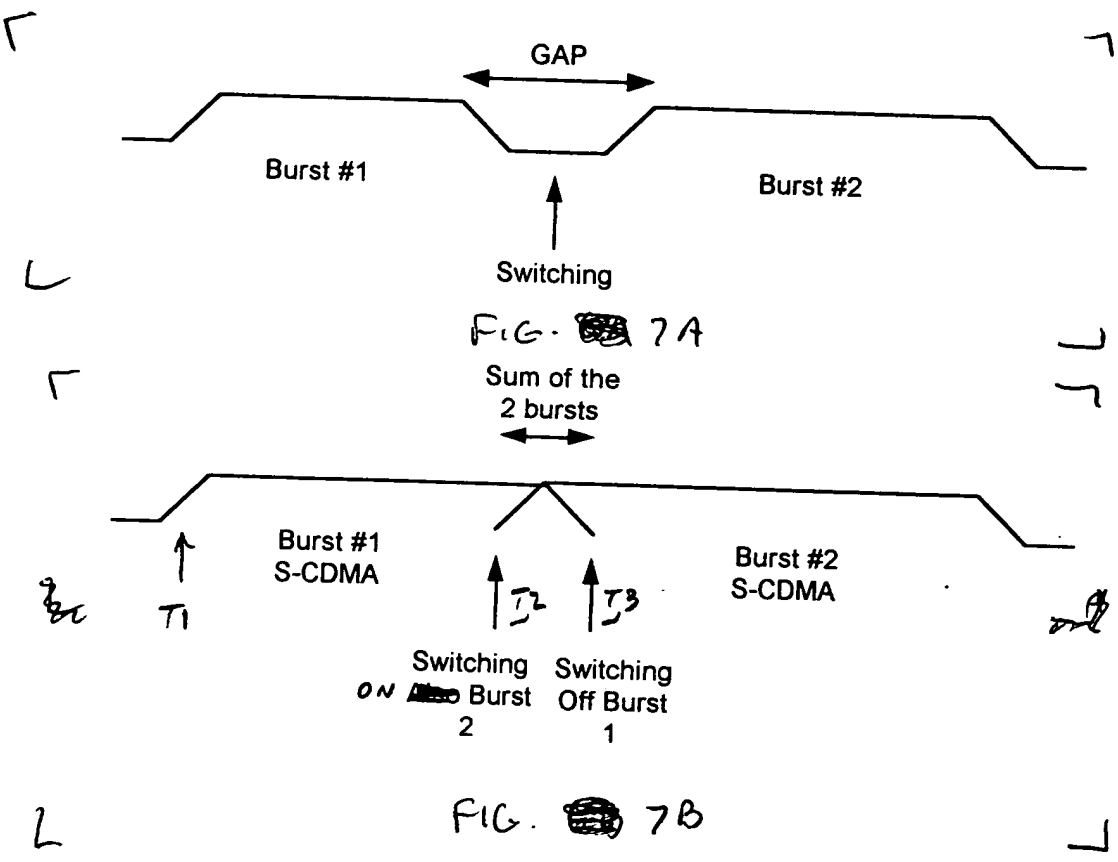


FIG. 7A

FIG. 7B